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Wiggins et al.

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(54) **NUTRITIVE SUBSTANCE DELIVERY CONTAINER**

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Related U.S. Application Data

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B65D 25/08 (2006.01)

(52) **U.S. Cl.**
USPC **206/221**; 206/219

(58) **Field of Classification Search** 206/219–222, 206/528, 531, 532, 568; 215/DIG. 8; 426/115, 426/120
See application file for complete search history.

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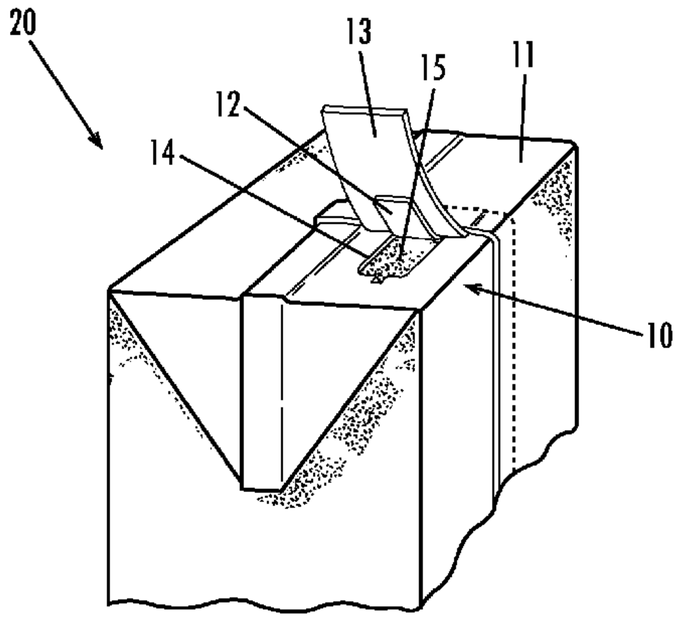
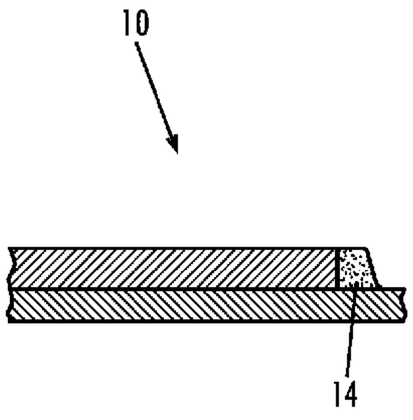
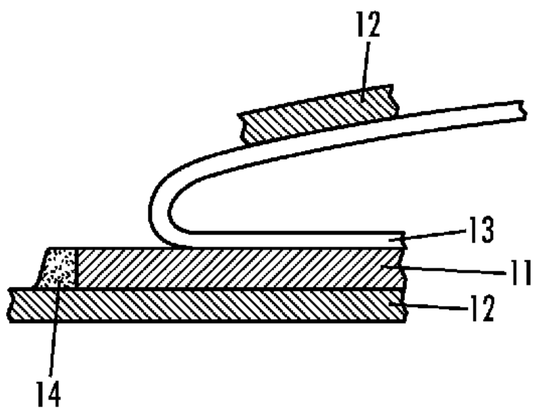
(57) **ABSTRACT**

The present invention is directed to a container for delivering a nutritive substance. In an embodiment, the present invention comprises a container that protects a nutritive substance from contact with the contents of the container and from contact with the atmosphere until the consumer is ready to use or consume the product. When desired, a seal on the container is altered such that the nutritive substance can come into contact with the container contents, delivering the nutritive substance thereto.

9 Claims, 11 Drawing Sheets







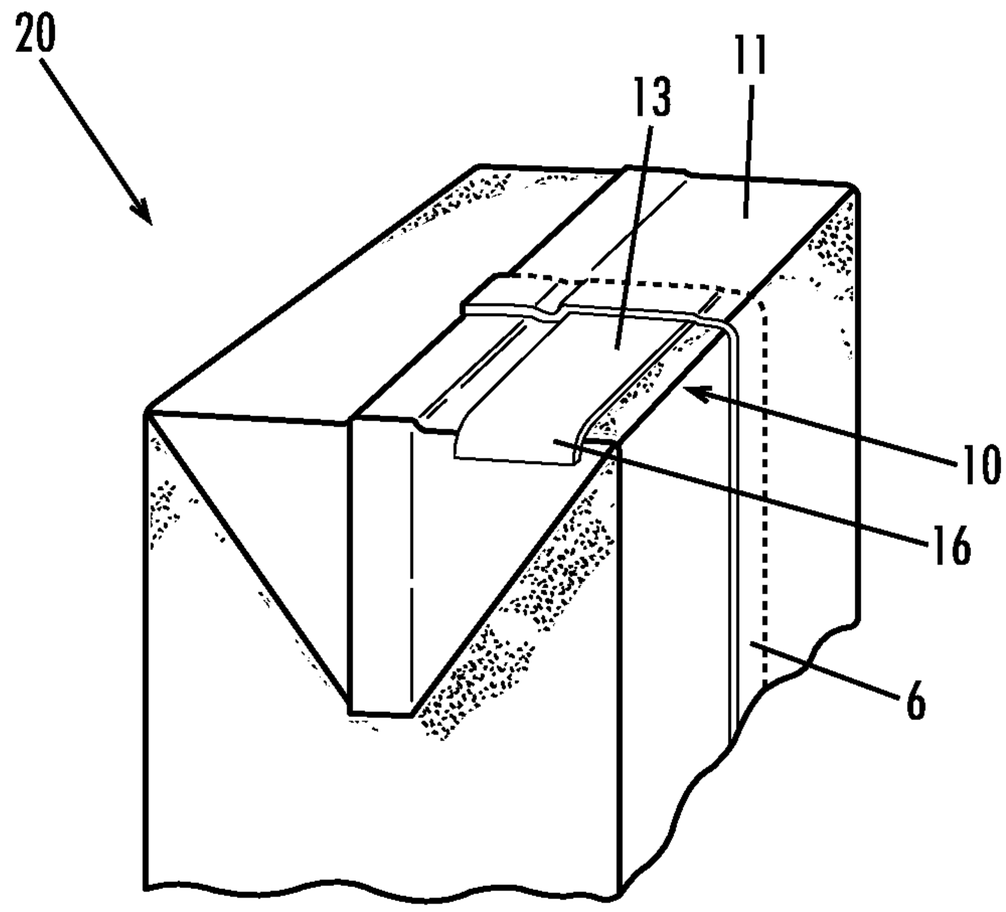


Fig. 1

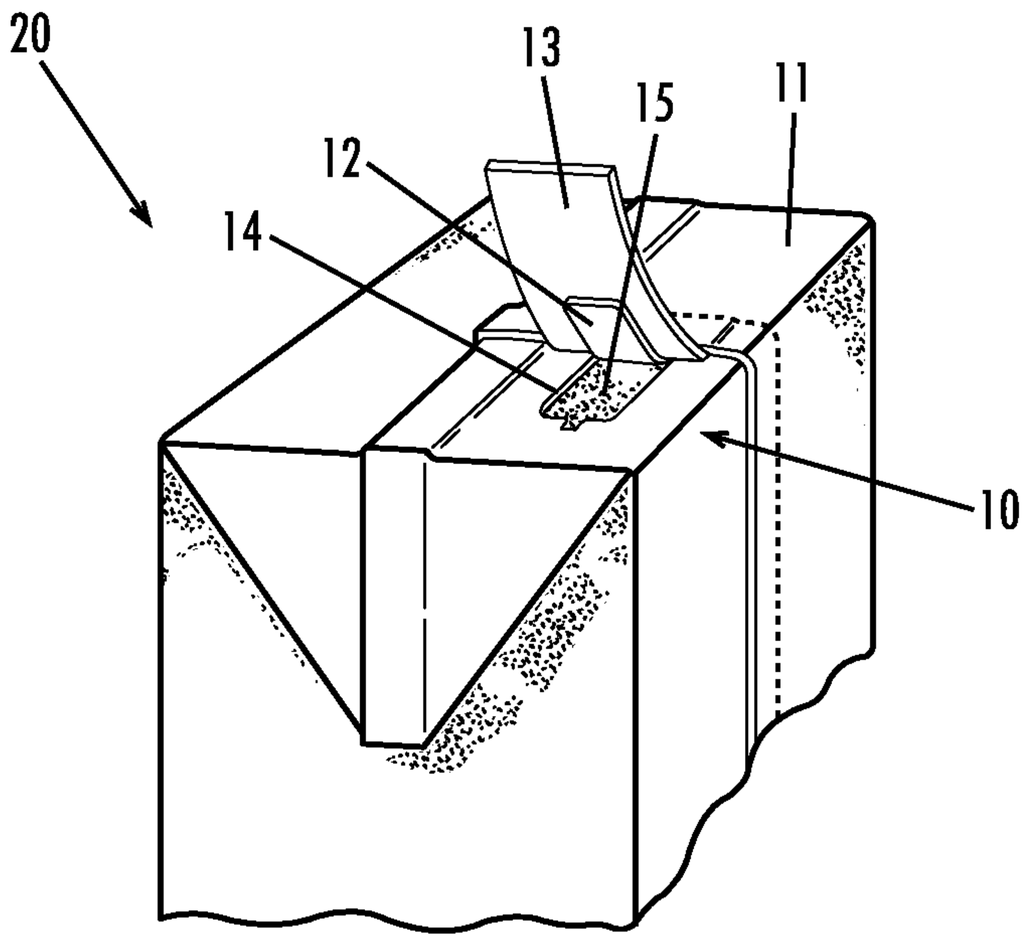


Fig. 2

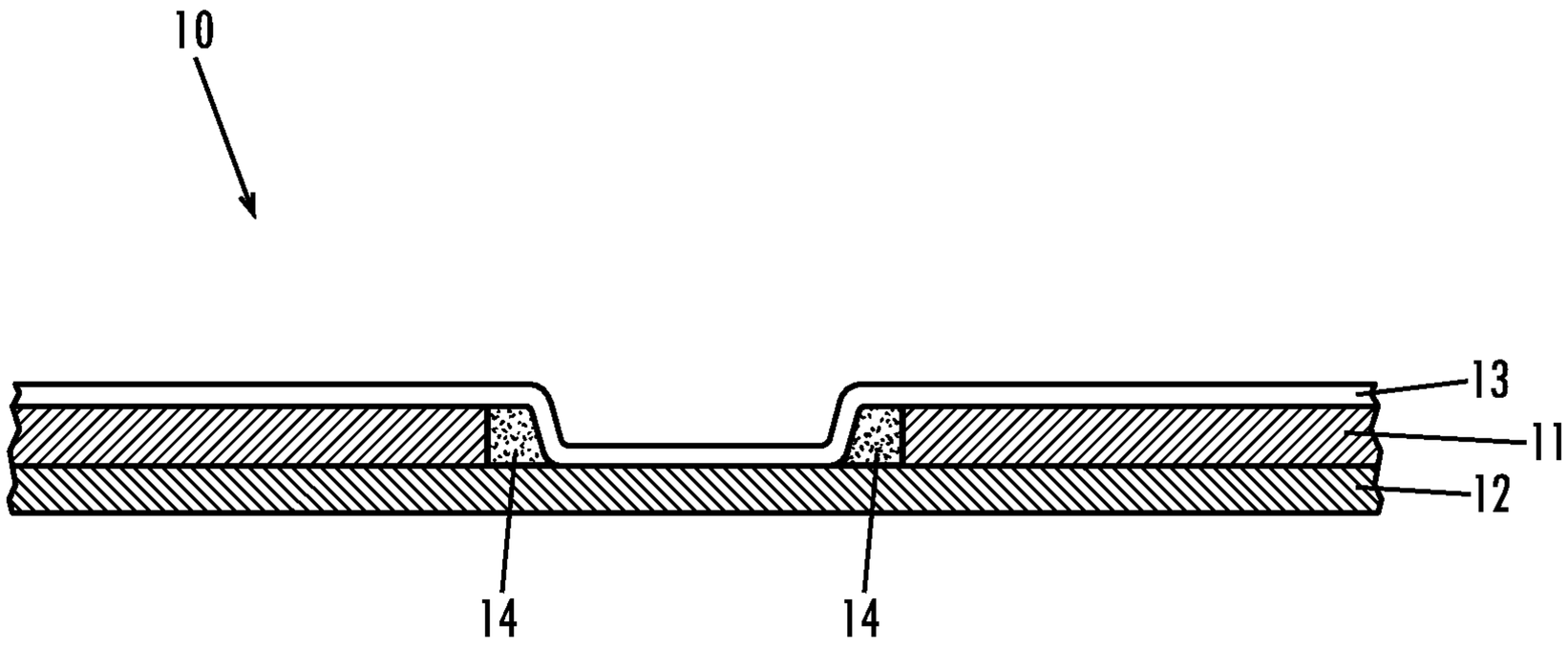


Fig. 3

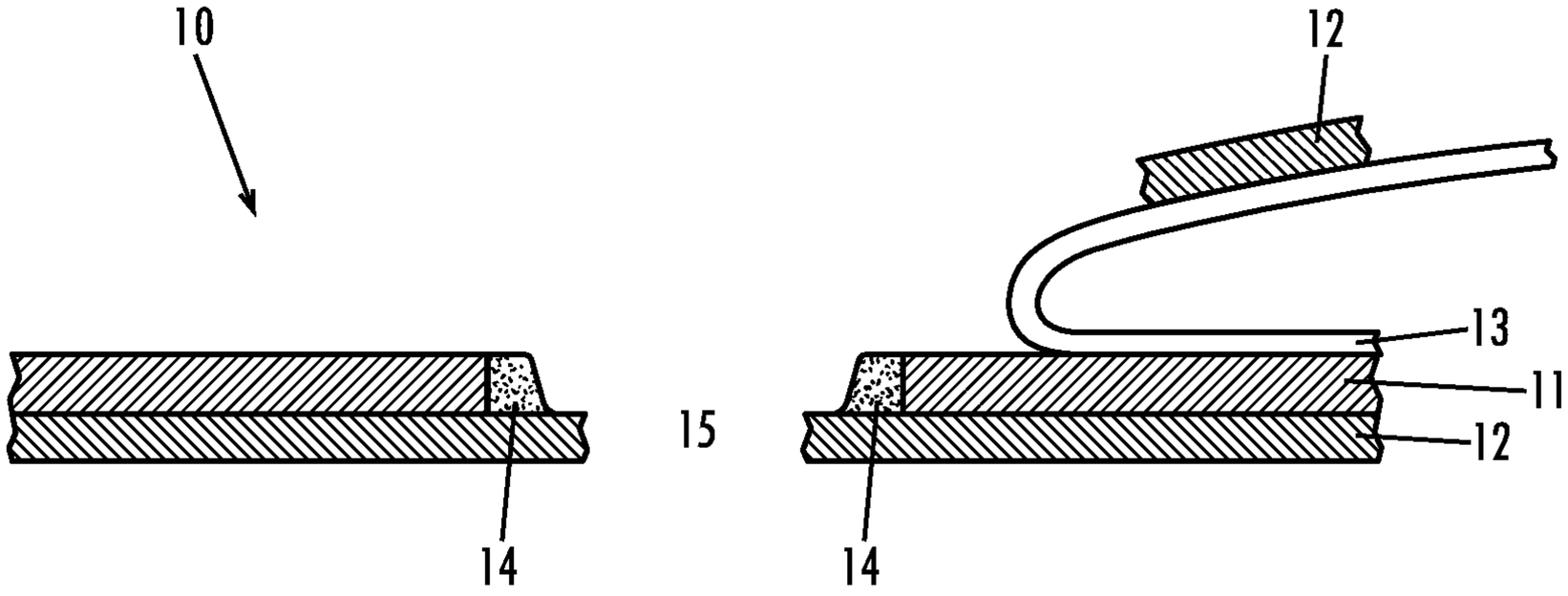


Fig. 4

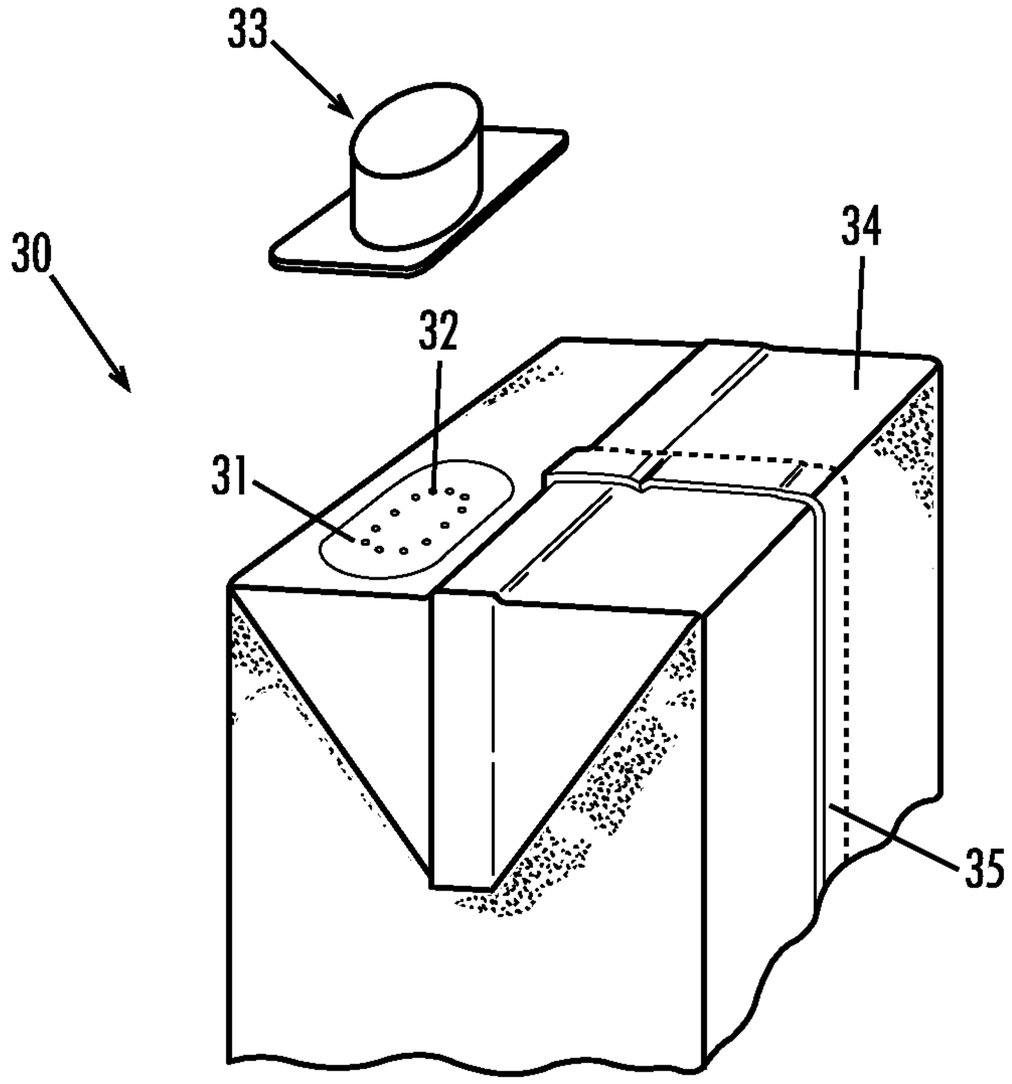


Fig. 5

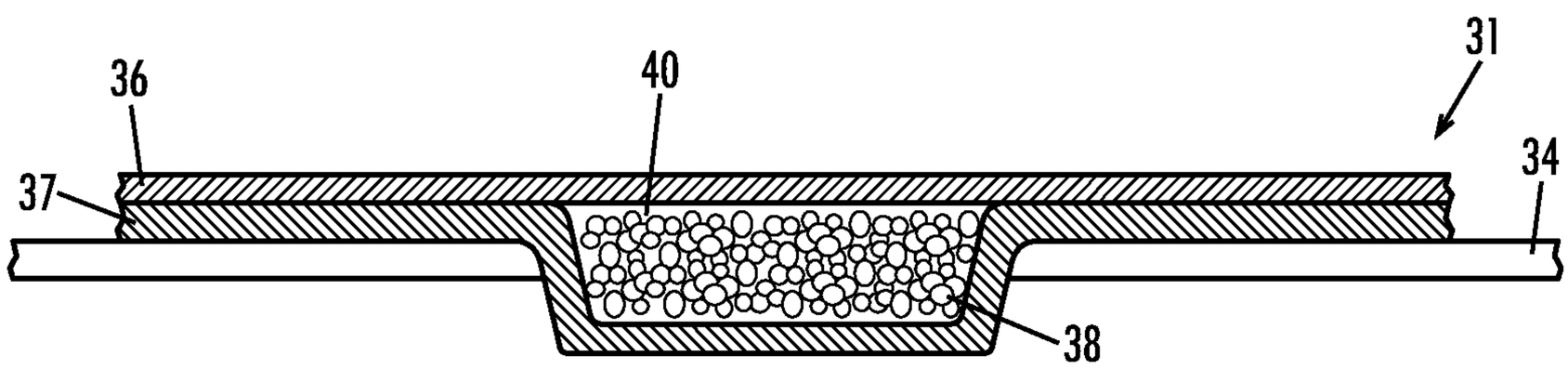


Fig. 6

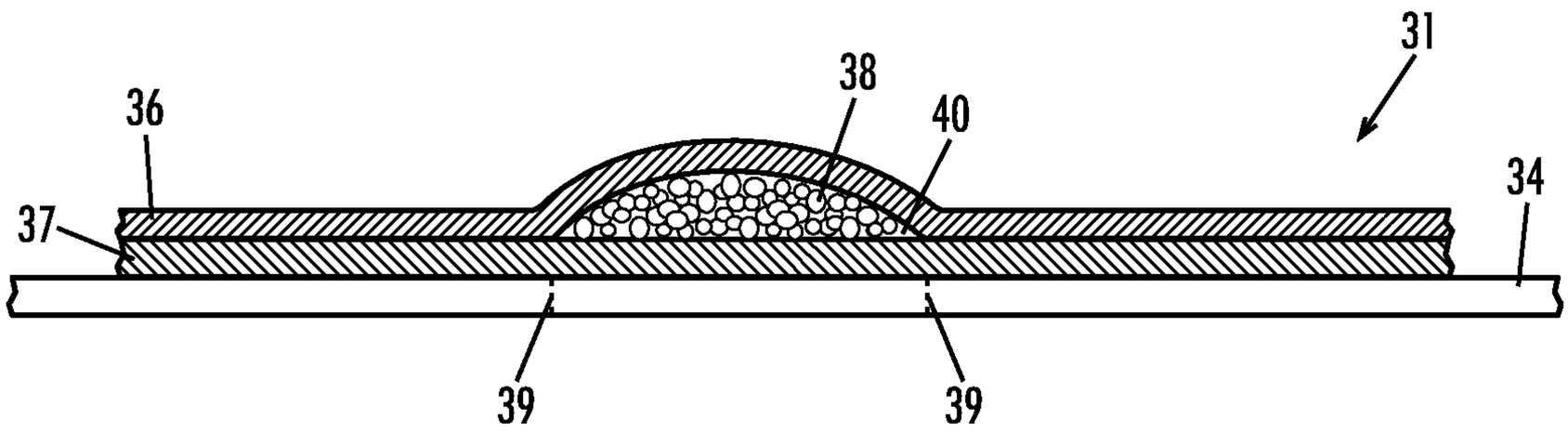


Fig. 7

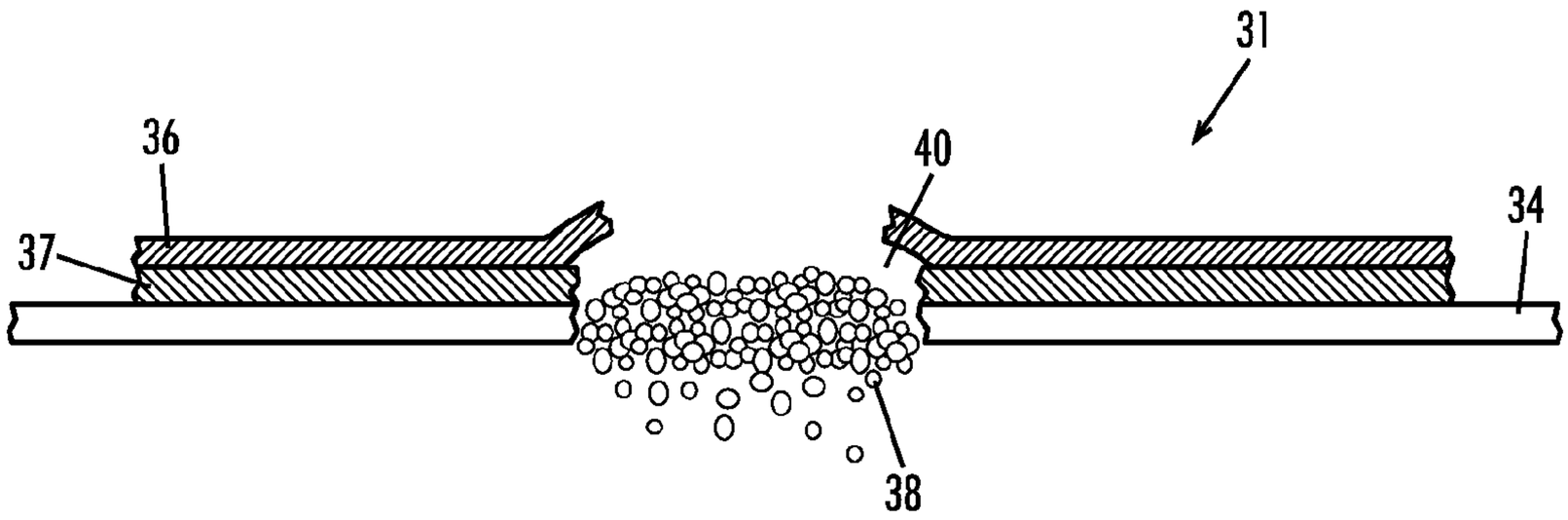


Fig. 8

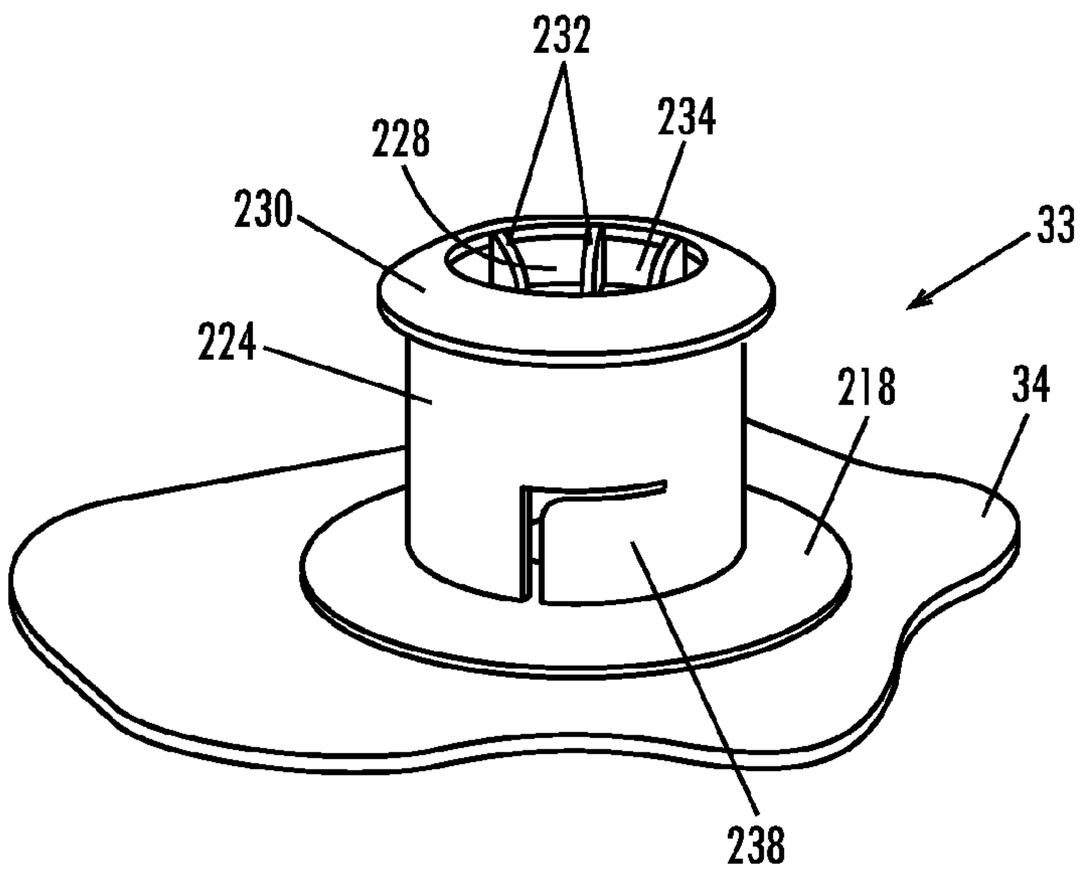
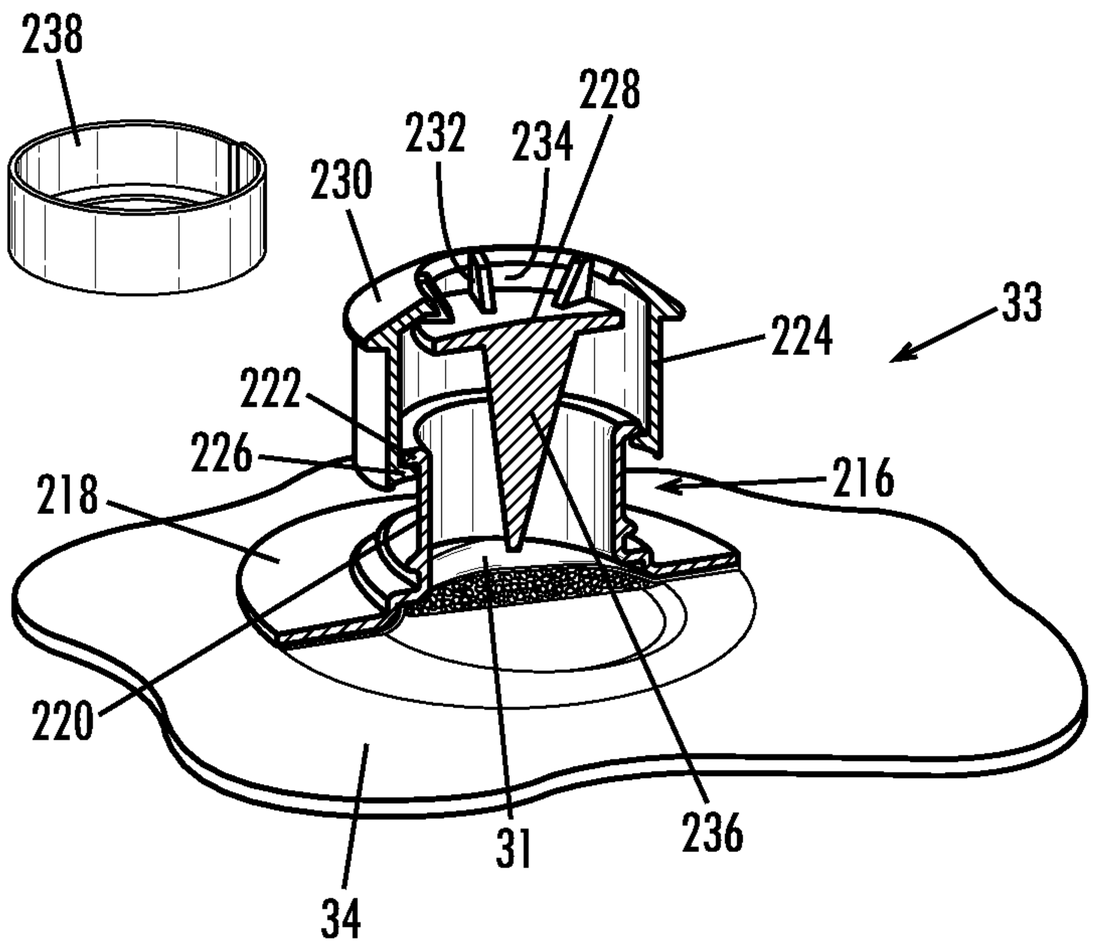


Fig. 9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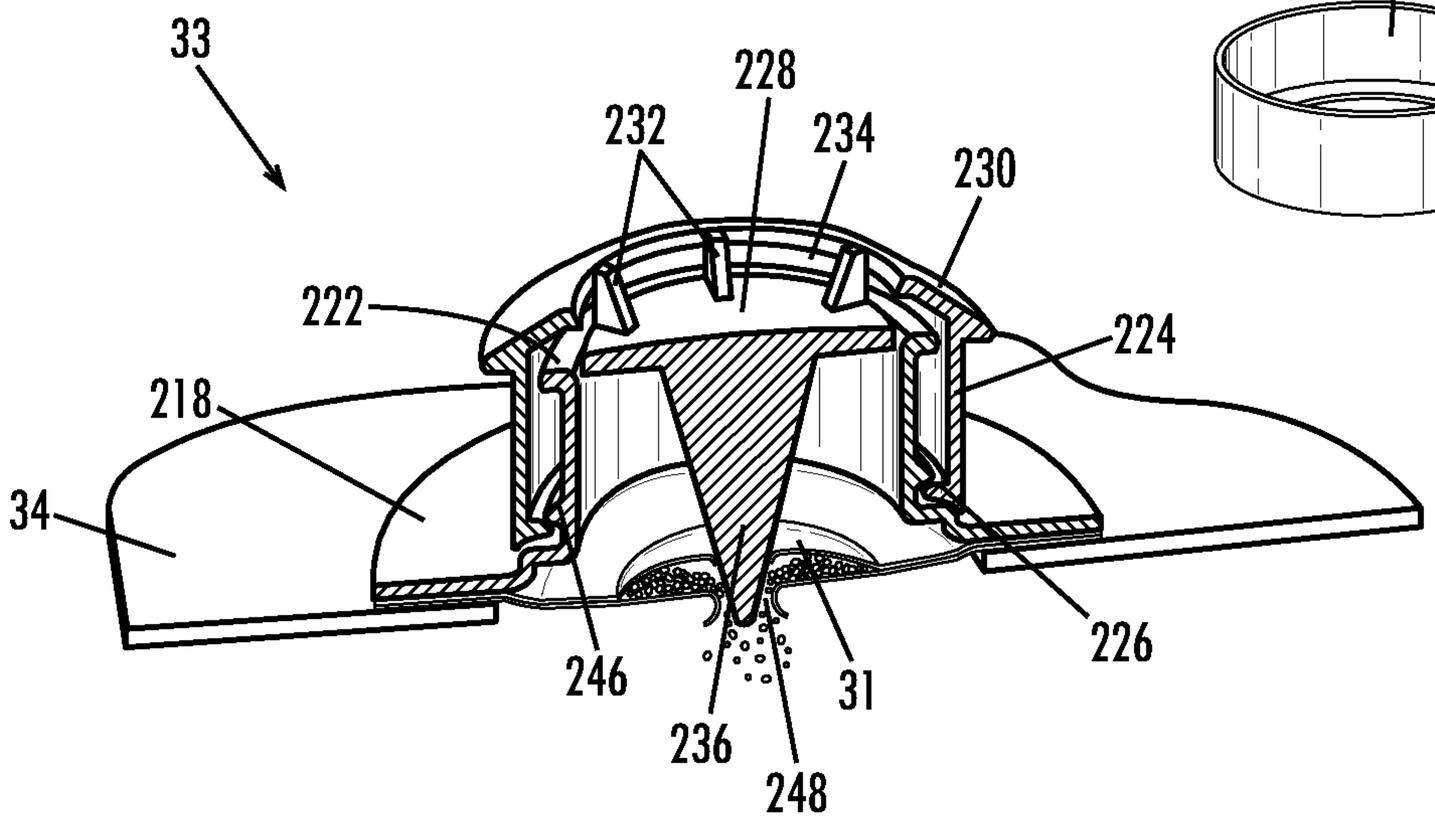
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Fig. 11

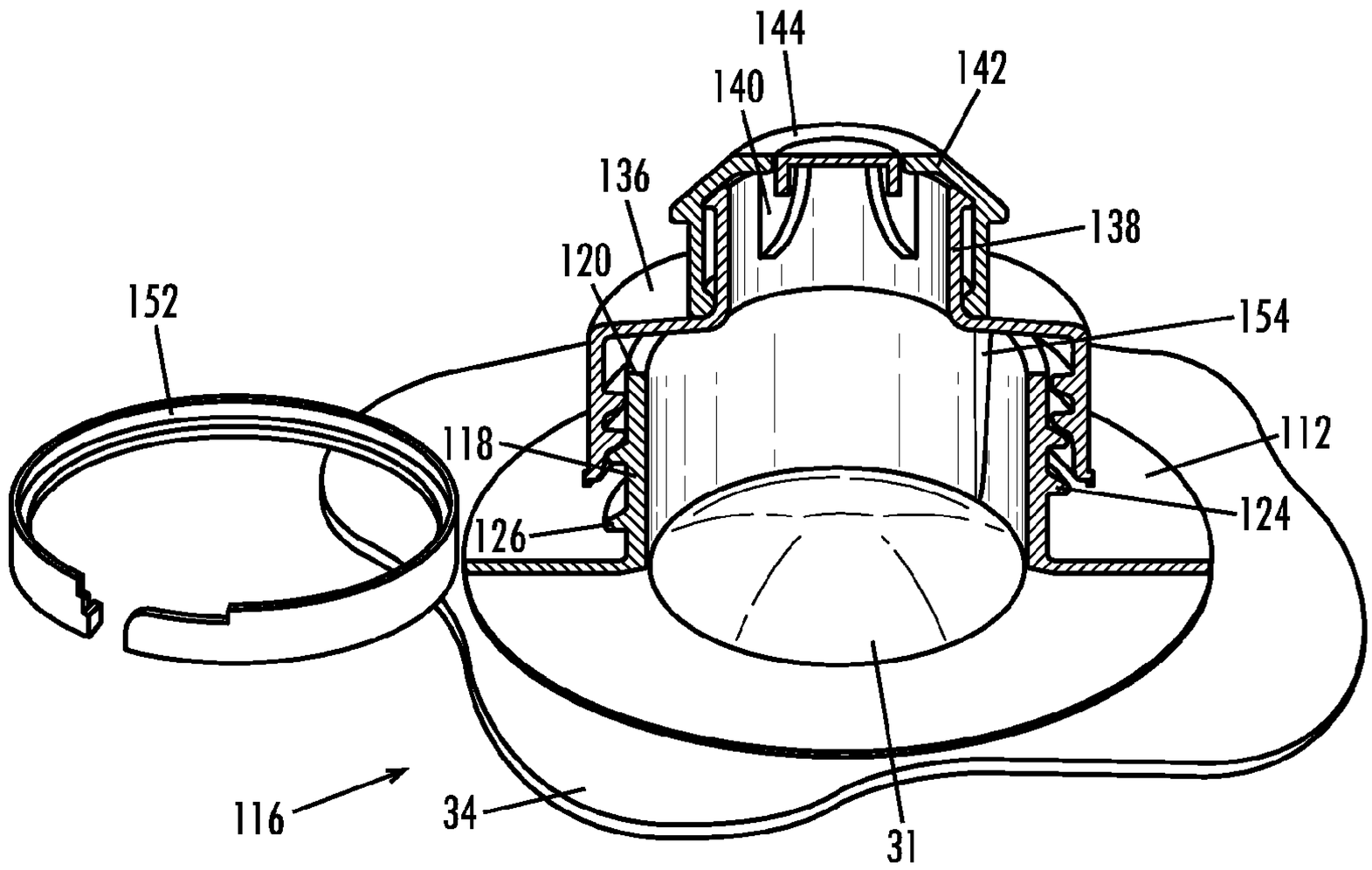
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Fig. 12

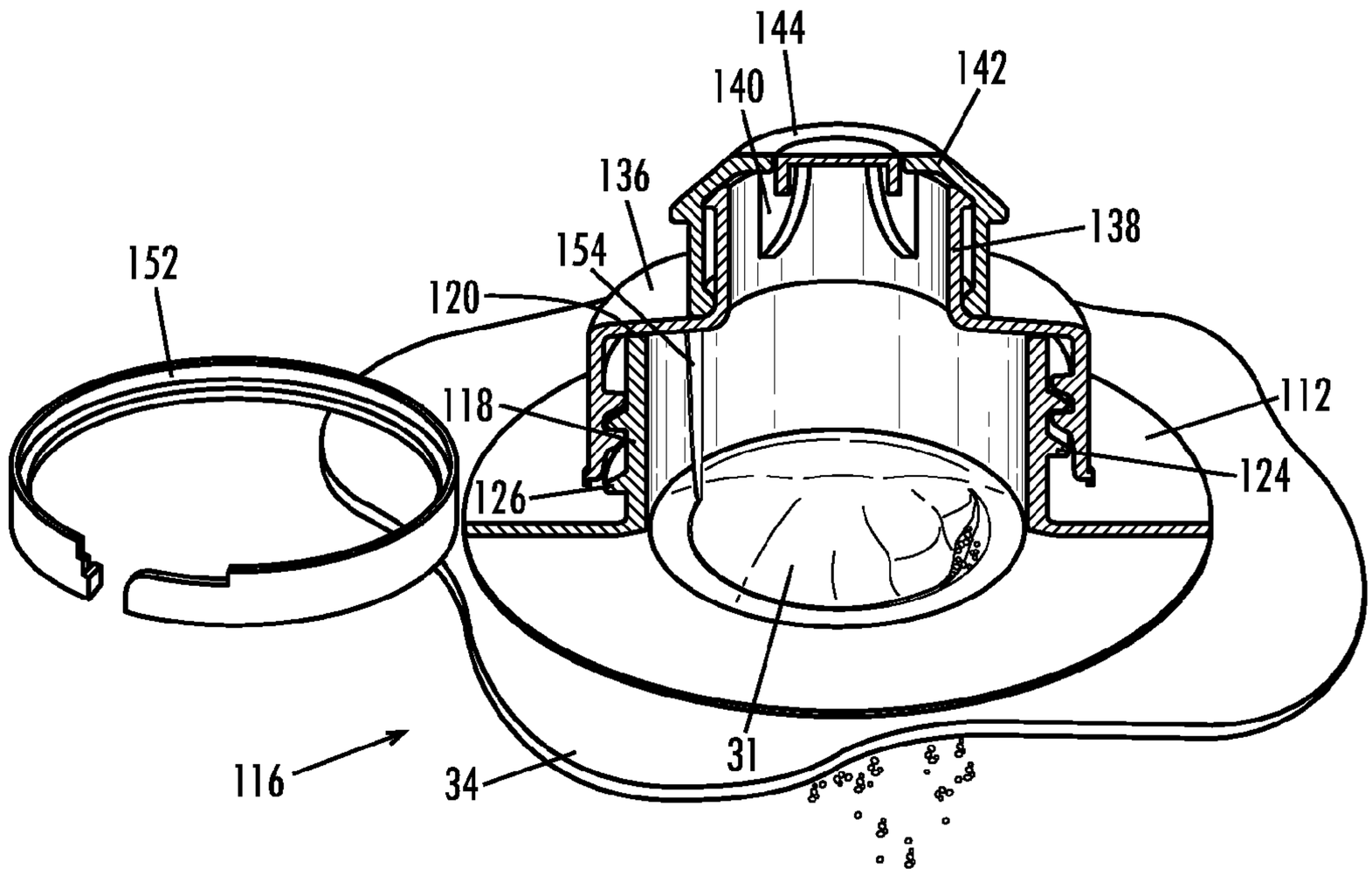
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Fig. 13

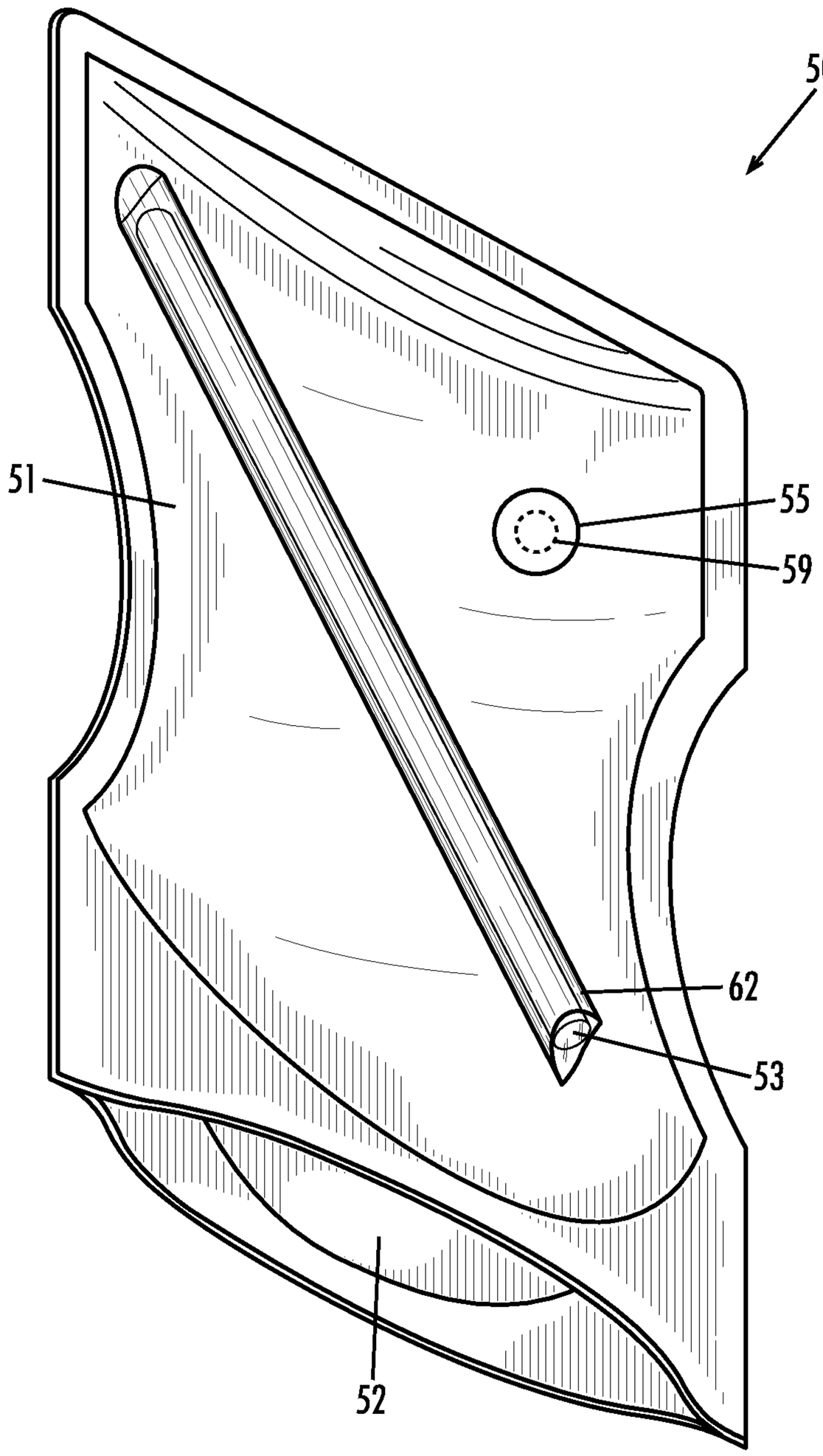

Fig. 14

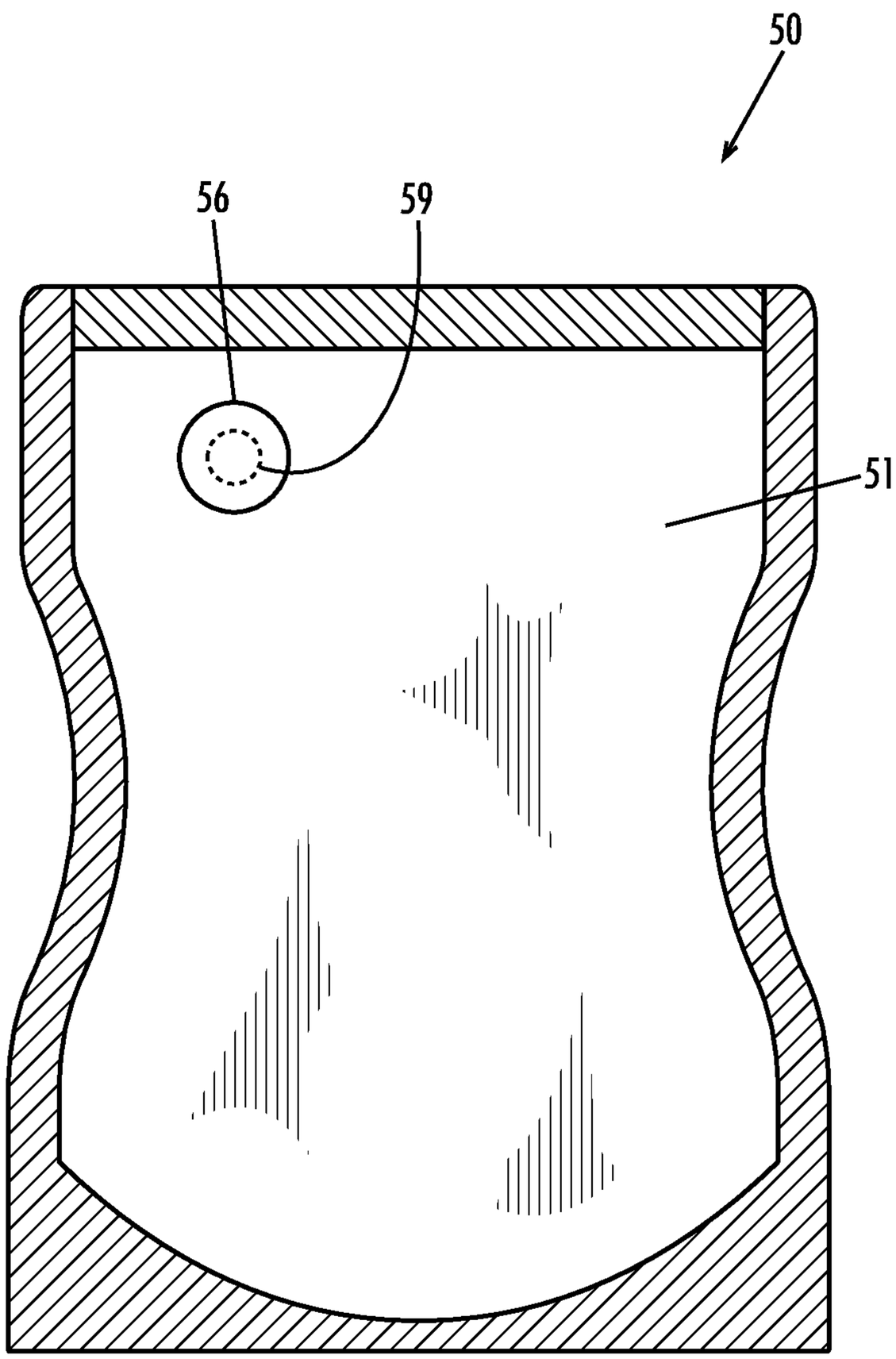

Fig. 15

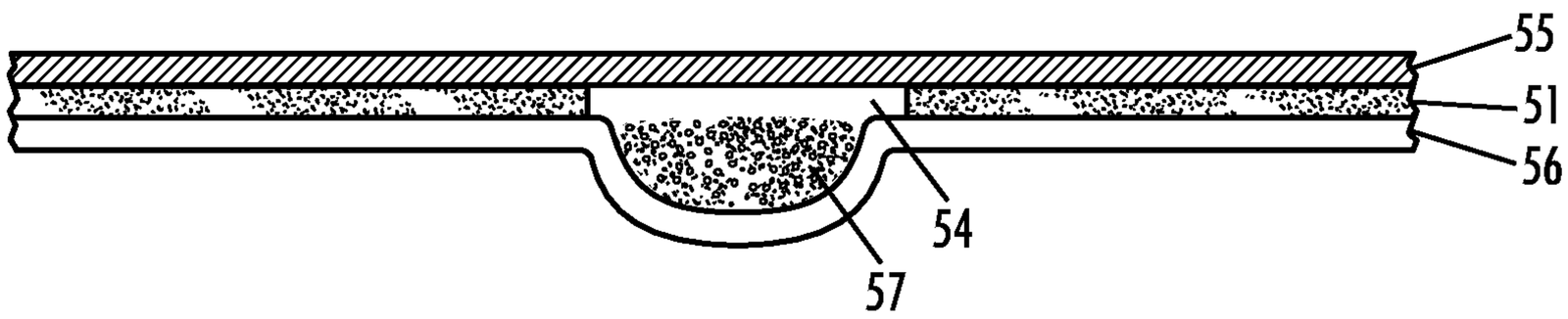

Fig. 16

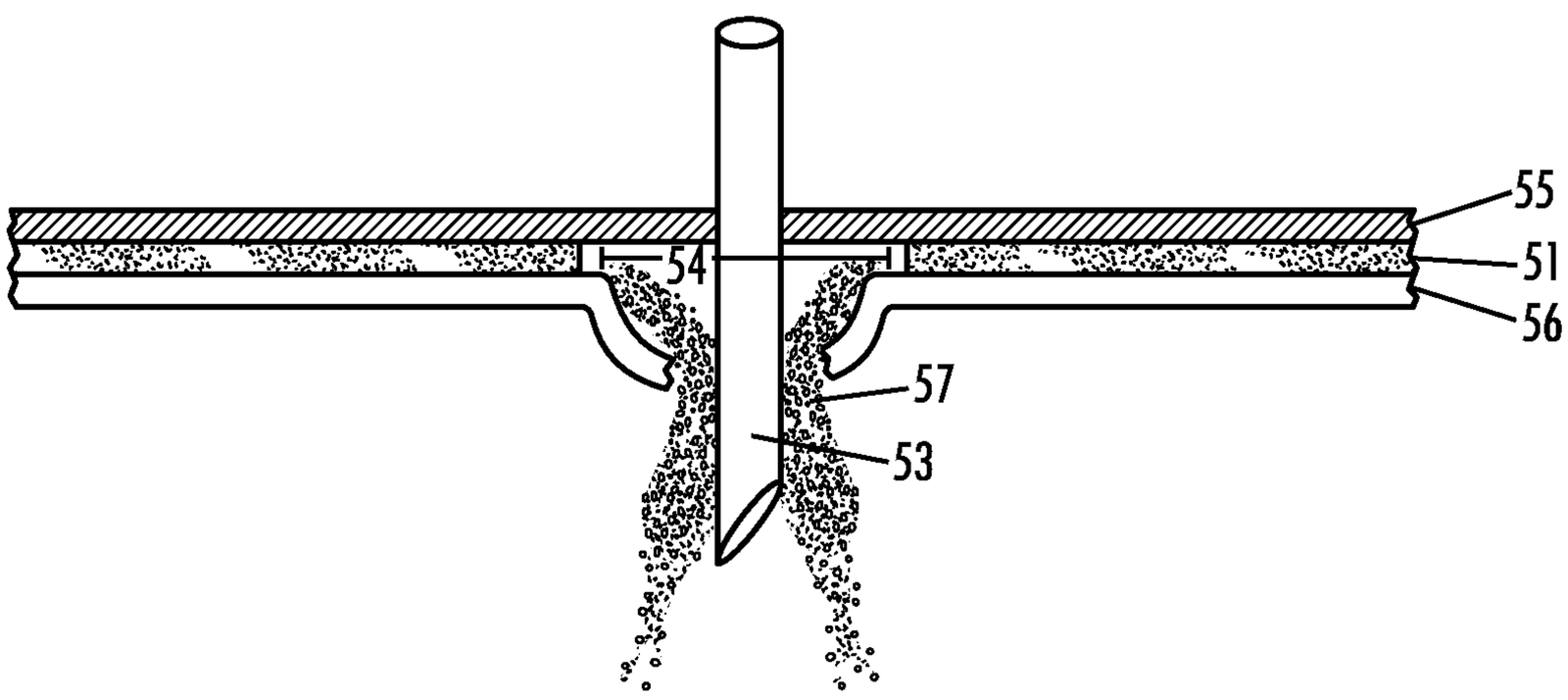

Fig. 17

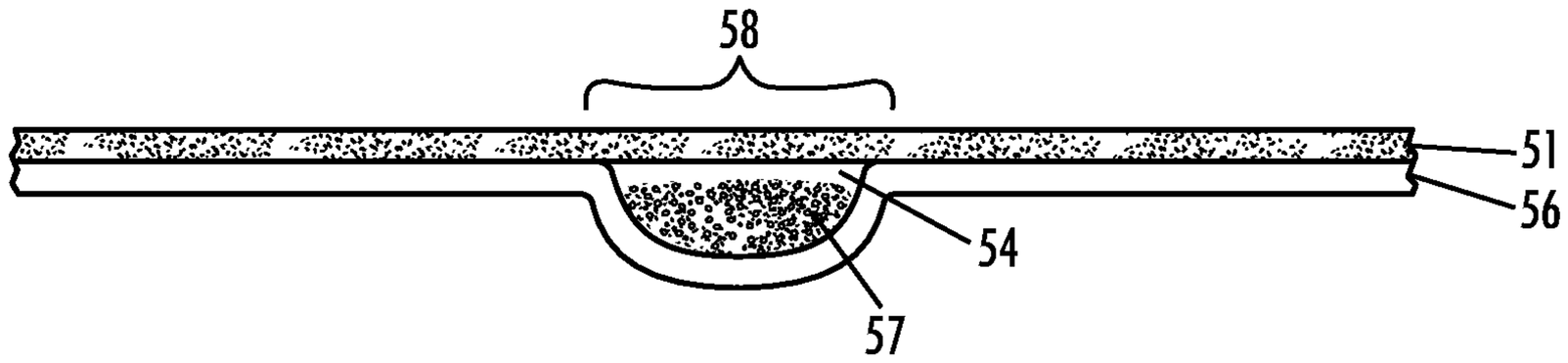

Fig. 18

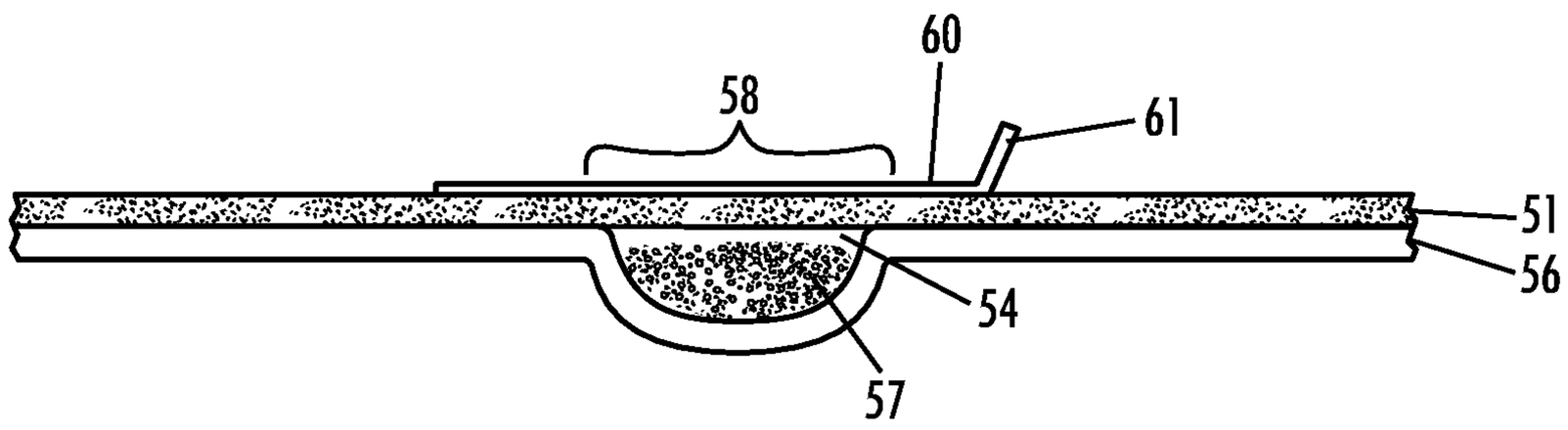

Fig. 19

NUTRITIVE SUBSTANCE DELIVERY CONTAINER

RELATED APPLICATION

This application is a continuation of copending and commonly assigned U.S. patent application having Ser. No. 12/574,271, filed Oct. 6, 2009, entitled Nutritive Substance Delivery Container, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to the field of container constructions.

SUMMARY OF THE INVENTION

Briefly, therefore, the present invention is directed in an embodiment to a container for delivering a nutritive substance comprising a container body having a base, at least one sidewall, and a top wall, wherein an aperture is formed in the top wall. The container also comprises an outer releasable seal releasably bonded to the exterior of the top wall, surrounding the aperture. The container has an inner sealing layer permanently bonded to the interior of the top wall, surrounding the aperture, wherein the inner sealing layer and the outer releasable seal are permanently bonded to one another within the aperture. In addition the container comprises a nutritive substance disposed between the inner sealing layer and the outer releasable seal such that removal of the outer releasable seal and inner sealing layer exposes the nutritive substance to the contents of the container.

The invention is also directed, in an embodiment, to a container for delivering a nutritive substance comprising a container body having a base and at least one sidewall, wherein an aperture is formed near the top edge of one sidewall. An outer pierceable seal is permanently bonded to the outside of the sidewall, covering the aperture. In addition, an inner pierceable seal is permanently bonded to the inside of the sidewall, covering the aperture. In this embodiment, the outer pierceable seal and inner pierceable seal form a pocket that is located within the aperture and a nutritive substance is located within the pocket.

In yet another embodiment, the invention is directed to a container for delivering a nutritive substance comprising a container body having a base and at least one sidewall, wherein a weakened region is formed near the top edge of one sidewall. An inner pierceable seal is permanently bonded to the inside of the sidewall, surrounding the weakened region, and the sidewall and inner pierceable seal form a pocket surrounding the weakened region. A nutritive substance is located within the pocket.

In a still further embodiment, the invention is directed to a container for delivering a nutritive substance comprising a container body having a base, at least one sidewall, and a top wall, wherein an aperture is formed in the top wall. A blister pack comprising a top layer and a bottom layer is permanently sealable to the container top wall over the aperture. The blister pack layers are formed to create a cavity therebetween and a nutritive substance is disposed within the blister pack cavity.

In yet another embodiment, the invention is directed to a container for delivering a nutritive substance comprising a container body having a base, at least one sidewall, and a top wall, wherein perforation lines are formed in the top wall such that the wall may be ruptured along the perforation lines under pressure. A blister pack comprising a top layer and a bottom layer is permanently sealable to the container top wall over the perforation lines. The blister pack layers are formed to create a cavity therebetween and a nutritive substance is disposed within the blister pack cavity.

BRIEF DESCRIPTION OF THE DRAWINGS

A full and enabling disclosure of the present invention, including the best mode thereof directed to one of ordinary skill in the art, is set forth in the specification, which refers to the appended figures, in which:

FIG. **1** is a partial perspective view of a container in accordance with one embodiment of the present invention;

FIG. **2** is a partial perspective view of a container in accordance with an embodiment of the present invention in which the outer releasable seal is pulled back from the container;

FIG. **3**. is a partial cut-away view of the container in accordance with a particular embodiment;

FIG. **4** is a partial cut-away view of the container in which the outer releasable seal has been pulled away from the container;

FIG. **5** is a partial perspective view of a container in accordance with an embodiment of the present invention;

FIG. **6** is a partial cut-away view of the container in accordance with a particular embodiment;

FIG. **7** is a partial cut-away view of the container in accordance with another embodiment;

FIG. **8** is a partial cut-away view of a container embodiment in which the blister pack has been broken;

FIG. **9** is a partial perspective view of a container top in accordance with one embodiment of the present invention;

FIG. **10** is a partial perspective cut-away view of the container top illustrated in FIG. **9**;

FIG. **11** is a partial perspective cut-away view of the container top illustrated in FIG. **9**;

FIG. **12** is a perspective cut-away view of a container top in accordance with one embodiment of the present invention;

FIG. **13** is a perspective cut-away view of a container top in accordance with one embodiment of the present invention;

FIG. **14** is a perspective view of a container in accordance with an embodiment of the present invention;

FIG. **15** is a cut-away view of the interior of the container illustrated in FIG. **14**;

FIG. **16** is a partial cut-away view of a container in accordance with a particular embodiment of the container;

FIG. **17** is a partial cut-away view of a container in which a straw is inserted into the container;

FIG. **18** is a partial cut-away view of another embodiment of the container;

FIG. **19** is a partial cut-away view of yet another embodiment of the container.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference now will be made in detail to the embodiments of the invention, one or more examples of which are set forth below. Each example is provided by way of explanation of the invention, not a limitation of the invention. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope or spirit of the invention. For instance, features illustrated or described as part of one embodiment, can be used on another embodiment to yield a still further embodiment.

Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents. Other objects, features and aspects of the present invention are disclosed in or are obvious from the following detailed description. It is to be understood by one of ordinary skill in the art that the present discussion is a description of exemplary embodiments only, and is not intended as limiting the broader aspects of the present invention. A repeat use of reference characters in the present specification and drawings represents the same or analogous features or elements of the invention.

As set forth above, the present invention relates generally to the field of container constructions. References related to container constructions may include U.S. Pat. Nos. 5,707,353 and 5,921,955 to Mazer, et al. and U.S. Pat. No. 6,098,795 to Mollstam, et al.

The technical problem to be solved by the present invention is to provide novel containers that are useful in delivering a nutritive substance to the contents of a container just before consumption of the contents. Thus, in an embodiment, the present invention is directed to containers that protect a nutritive substance from contact with the contents of the container and from contact with the atmosphere until the consumer is ready to use or consume the product. When desired, a seal on the container is altered such that the nutritive substance can come into contact with the container contents, delivering the nutritive substance thereto.

In an embodiment, the container is a rigid carrier of paper, cardboard, or other fibrous material. The container may have one or both sides coated with a plastic material, such as polyethylene, which provides the container with the required liquid tightness and barrier properties. The container may additionally have one or more metal foil layers, such as aluminum foil, between the paper layer and the plastic layer. In some embodiments, the paper or cardboard container is coated with wax. In a particular embodiment, the container is packaged under aseptic conditions such that the contents of the container maintain their sterility in the closed container over a sustained period of time.

Referring now to the drawings, FIG. **1** illustrates an embodiment of the container **20** in a parallelepipedic configuration. In another embodiment, the container **20** may have a gable-top configuration. The container **20** may be produced in any shape known in the art or yet to be developed. For example, the container may be square, rectangular, or round. The container may have a base (not shown), at least one sidewall **6**, and a top wall **11**.

FIGS. **1** and **2** further illustrate the container **20** having an aperture **15** in the top wall **11** of the container **20**. In an embodiment, the aperture **15** may be located near a corner edge of the top wall **11**. However, this aperture **15** location is not required. The aperture **15** may be located anywhere in the top wall **11** of the container **20**. Alternatively, the aperture **15** may be located in a sidewall of the container. Similarly, while the aperture **15** is shown as being rectangular in FIG. **2**, it could be circular, triangular, ovular, oblong, or any other shape that is known in the art or yet to be developed. The aperture may be punched into the paper or cardboard material prior to construction or filling of the container.

A closure **10** is shown in the drawings. An outer releasable seal **13** is shown as covering the aperture **15**. The outer releasable seal **13** may be disposed such that it covers both the aperture **15** and a region surrounding the aperture **15**. The outer releasable seal **13** may be releasably sealed to the top wall **11** of the container **20** surrounding the aperture **15**. One skilled in the art should be familiar with such releasably attached seals. Specifically, adhesive or heat may be used to attach outer releasable seal **13** to top wall **11** to form an airtight seal. The outer releasable seal **13** may be formed of polyvinyl chloride, polystyrene, a laminate foil, or other suitable material.

The outer releasable seal **13** may have a pull-tab **16** located along one edge of the seal, which extends outwardly or upwardly from the outer releasable seal **13**. The pull-tab **16** enables a user to pull upwards and/or backwards on the outer releasable seal **13** to reveal the aperture **15**. In another embodiment, the pull-tab **16** may be attached across the center of outer releasable seal **13**, configured such that pulling up and away from the container **20** reveals aperture **15**. Pull-tab **16** may be formed from the same material as outer releasable seal **13** or may be formed of, or coated with, a different material to increase gripability of the tab. The pull-tab **16** may be bonded to or integrally formed with outer releasable seal **13**.

As shown in FIGS. **3-4**, aperture **15** is sealed off from the container contents by an inner sealing layer **12**. The inner sealing layer may be a part of an unbroken interior layer of the packaging material or may be a specially applied strip which is sealed around the aperture **15** against the inside of the container **20**. In an embodiment, the inner sealing layer **12** is permanently bonded to the interior of the container surrounding the aperture **15**. In another embodiment of the invention, the inner sealing layer **12** is permanently bonded to the outer releasable seal **13** in the region within the aperture **15**. Such permanent bond may be achieved through pressure, heat, or other means known in the art. The inner sealing layer **12** may be formed of polyvinyl chloride, polystyrene, a laminate foil, or other suitable material.

In an embodiment, the inner sealing layer **12** may have perforation or weakening lines present along the edge of the aperture **15**. This arrangement eases the removal of the portion of inner sealing layer **12** that is within the aperture **15** when the outer releasable seal **13** is removed from the container **20**.

In an embodiment shown in FIGS. **2-4**, a nutritive substance **14** may be present in the space between the outer releasable seal **13**, the inner sealing layer **12**, and the container top wall **11**. The nutritive substance **14** may surround the circumference of the aperture or may be present near one side or edge of the aperture. The nutritive substance **14** may be bonded to the upper side of the inner sealing layer **12** or the portion of the container top wall **11** which is located between the outer releasable seal **13** and the inner sealing layer **12**. In this configuration, the nutritive substance **14** is protected from the container contents and the atmosphere until the outer releasable seal **13** is altered or removed.

When the consumer is ready to consume or use the contents of the container, pull-tab **16** may be gripped and pulled away from container **20**, causing the bond between the outer releasable seal **13** and the container top wall **11** to fail. The outer releasable seal **13** may be wholly removed from container **20** or, as shown in FIGS. **2** and **4**, may be partially pulled backward enough to reveal aperture **15**. If present, the perforation or weakening lines on the inner sealing layer **12** may be subjected to stress and may break. The bond between outer releasable seal **13** and inner sealing layer **12**, however, is maintained and the portion of inner sealing layer **12** within the aperture **15** is removed from the container. The nutritive substance **14** remains attached to the portion of inner sealing layer **12** which remains attached to top wall **11** or the portion of top wall **11** which surrounds the aperture **15**. The container contents and nutritive substance **14** are then exposed to the atmosphere because the aperture **15** is exposed. Each time the consumer inverts the container **20**, the contents of the con-

tainer **20** flow from the container through aperture **15** and into contact with the nutritive substance **14**, providing a gradual release of the nutritive substance **14** prior to or during consumption of the product.

In a separate embodiment, the nutritive substance **14** may fall into the container contents upon removal of the portion of inner sealing layer **12** within the aperture **15**. In this embodiment, the nutritive substance immediately contacts the product within the container.

In some embodiments, the container may be used to pour the container contents out for use in a recipe or into another container for mixing with other ingredients or components. In a different embodiment, the container may be used to pour out the contents into another container for consumption. In yet another embodiment, a consumer may drink directly from the container. In such an embodiment, the consumer may place the aperture **15** directly to his or her mouth, invert the container, and drink therefrom. In other embodiments, a consumer may insert a straw through the aperture **15** and consume the contents through the straw. In further embodiments, the container may be used for cooking of products directly in the container. For example, the container could be vented and used to cook a frozen food.

In some embodiments, the container **20** may be resealed after opening. Any resealing mechanism known in the art could be used in this embodiment. For example, the outer releasable seal **13** could be manufactured such that it can be used for re-closing the aperture **15** after use of the product. As another example, a cap or lid may be used to reseal the container.

In another embodiment shown in FIGS. **5-8**, the container **30** may again have a parallelepipedic configuration. In another embodiment, the container **30** may have a gable-top configuration. The container **30** may be produced in any shape known in the art or yet to be developed. For example, the container may be square, rectangular, or round. The container may have a base (not shown), at least one sidewall **35**, and a top wall **34**.

The container **30** may have an aperture (not shown) in the top wall **34** of the container **30**. The aperture may be located anywhere in the top wall **34** of the container **30**. Alternatively, the aperture may be located in a sidewall of the container. Similarly, the aperture could be circular, triangular, ovular, oblong, or any other shape that is known in the art or yet to be developed. The aperture may be punched into the paper or cardboard material prior to construction or filling of the container.

In another embodiment, the container **30** may not have an aperture, but may have perforation lines **39** (shown in FIG. **7**) formed in the top wall **34** of the container. The perforation lines **39** may be circular, triangular, ovular, oblong, or any other shape that is known in the art or yet to be developed.

In the embodiment shown in FIGS. **5-8**, a blister pack **31** may be applied to the container over the aperture or perforation lines **39**. The blister pack **31** may comprise a bottom layer **37** and a top layer **36**. In one embodiment (FIG. **6**), the bottom layer **37** of the blister pack **31** is deformed and encases a cavity **40** formed between bottom layer **37** and top layer **36**. The top wall **34** of the container **30** has an aperture formed therein in this embodiment. The bottom layer **37** of the blister pack **31** fits within the aperture formed in top wall **34**. The blister pack **31** may be permanently sealable to the top wall of the container **30**, thereby preventing contact between the container contents and the atmosphere upon sealing.

In this embodiment, both of bottom layer **37** and top layer **36** are rupturable. Upon rupture of the bottom layer **37** and top layer **36**, a nutritive substance **38** stored within the cavity is released into the container **30**.

In another embodiment (FIG. **7**), the top layer **36** of the blister pack **31** comprises a deformable raised portion which encases a cavity **40** formed between bottom layer **37** and top layer **36**. The top wall **34** of the container **30** may or may not have an aperture formed therein. The top wall **34** may contain perforation lines **39** formed therein.

In this embodiment, both of bottom layer **37** and top layer **36** are rupturable. If the container top wall **34** has perforation lines formed therein, the area within such perforation lines is also ruptured upon rupture of the bottom layer **37** and top layer **36**. The nutritive substance **38** stored within the cavity is then released into the container **30**.

The layers of the blister pack **31** may be formed of polyvinyl chloride, polystyrene, a laminate foil, or other suitable material. The blister pack **31** may be ruptured by insertion of a straw therethrough, manual pressure exerted by a users finger, use of the container cap to rupture, or any other means known in the art or yet to be developed.

In a particular embodiment (FIG. **5**), a closure **33** is sealed over the blister pack **31**. The closure **33** may have means therein to rupture the blister pack **31**. For example, as shown in FIGS. **9-11**, the closure **33** may comprise a body **216** with a base **218** formed at one end of a vertical wall **220** and a flange **222** formed at the other end. An annular cap **224** may be received by vertical wall **220** and define an inwardly pointing flange **226** that cooperates with vertical wall flange **222**. Annular cap **224** may include a top surface **228** that connects to a shoulder **230** by a plurality of ribs **232**. A plurality of holes **234** may be defined between ribs **232**. Annular cap top surface **228** may define a downward pointing cutting portion, or spike **236**, which may be formed by a flat body or may include multiple ribs or spikes positioned transverse to one another. A tear band **238** (FIG. **9**) may connect to a bottom edge of annular cap **224** to maintain annular cap **224** in an extended position relative to body **216**. In other words, tear band **238** may prevent annular cap **224** from being pressed downward with respect to vertical wall **220**.

With reference to FIGS. **10-11**, the blister pack **31** may be bonded to the top wall **34** of container **30**. Referring to FIG. **11**, in use, a consumer may remove tear band **238** (FIG. **10**) and press annular cap **224** downward with respect to body vertical wall **220**. As annular cap **224** moves downward, spike **236** begins to pierce the blister pack **31**. The consumer can continue to press annular cap **224** downward until inwardly pointing flange **226** bottoms out against base **218**, which will pierce the largest hole **248** in blister pack **31**, thereby exposing the nutritive substance **38** to the contents of the container. In this arrangement, closure **33** is in its closed first position where annular cap inwardly pointed flange **226** engages a second outward extending flange **246** on body vertical wall **220**, thereby retaining the cap in the closed position. While closed, the consumer may shake the contents of the container causing the contents of the container to contact the nutritive substance.

If the user pulls annular cap **224** upward, annular cap inwardly pointing flange **226** moves over flange **246** and is prevented further upward movement when it contacts vertical wall outwardly pointing flange **222**. In this position, each time the consumer inverts the container, the contents of the container flow from the container **30** through hole **248** into contact with the nutritive substance **38**, which provides a gradual release of the nutritive substance during consumption of the product. It should be understood that a tear band is not required in this embodiment. Any device which prevents

spike **236** from contacting blister pack **31** until just before consumption of the product may be utilized in this embodiment.

Referring particularly to FIGS. **12-13**, cylindrical top portion **112** may include a threaded cylindrical portion **118** that defines a rim **120** at one end thereof. Rim **120** may define an aperture in fluid communication with an inner chamber defined by cylindrical top portion **112**. Cylindrical top portion **118** may be adapted for the removable receipt of closure **116** by a helical thread **124**, which may be integrally formed on threaded cylindrical portion **118**. Helical thread **124** may begin proximate to rim **120** and may terminate proximate a flange **126**.

In some embodiments, closure **116** includes an annular cap having a helical thread **130** on its inner circumference for removably securing annular cap to the externally threaded cylindrical top portion **118**. The outer circumference of the annular cap may contain ribs or knurling to allow the user to more easily grip closure **116** to remove it from, or fit it on, top portion **112**. In addition to its internally threaded cylindrical wall, the annular cap may include an annular end wall **136** having an extension **138** defining a though hole **140** therein. A second annular enclosure **142**, having an opening **144** therein, may be operatively secured to annular end wall extension **138** so that second annular enclosure **142** is moveable between a first position where second closure **142** prevents the contents of the container from flowing through opening **140**, and a second position where the contents of the container are able to flow through opening **140**. A cutting portion, or blade **154**, may extend axially downward from the under surface of annular end wall **136** proximate rim **120**. It should be understood that closure **116** may be formed from any type of suitable closure known in the art.

A blister pack **31** may be may be bonded to the top wall **34** of container **30**. A tear band **152** may retain closure **116** on cylindrical top portion **112** in a raised position so that blade **154** does not engage blister pack **31**. That is, when tear band **152** is in place, the tear band blocks further tightening of closure **116** so that blade **154** cannot engage blister pack **31**. The tear band also acts as an anti-tamper band to prevent the closure from being removed prior to purchase by a consumer. The tear band may be connected to the bottom edge of annular cap **128** in many ways. For example, tear band **152** may be integrally formed with annular cap **128** with a gap formed therein to allow a consumer to tear the band away from the cap. In other embodiments, tear band **152** may connect to a lower edge of annular cap **128** by a plurality of relatively thin and frangible breakaway tongues or webs (not shown). An internally, radially inwardly projecting and angularly extending ridge(s) (not shown) may be formed on an inner circumference of tear band **152**, which engages an under surface flange **126**. Thus, tensile forces rotationally fix the tear band to the flange as annular closure **116** is unthreaded off the container. As the annular closure is rotationally removed, both tensile and torsional forces acting on the webs cause the webs to sever allowing closure **116** to be completely removed. If closure **116** is removed, blister pack **31** remains bonded to container **30**, thereby protecting the contents of the container and the nutritive substance from exposure to the atmosphere and each other.

Referring to FIGS. **12-13**, in use, a consumer may remove tear band **152** (FIG. **12**) and rotate closure **116** clockwise (with respect to FIG. **12**). As closure **116** turns, blade **154** is drawn downward into contact with blister pack **31**, which causes blade **154** to cut the blister pack **31**. Continued rotation (FIG. **13**) of closure **116** in the clockwise direction causes blade **154** to cut an arc **156** through the blister pack adjacent to rim **120**, thereby exposing the nutritive substance **38** to the atmosphere and the contents of the container. When tear band **152** is attached, blade **154** may be positioned adjacent to blister pack **31** so that a minimum number of revolutions are necessary to cut blister pack **31**. In this configuration, when closure **116** is in its rotated position, each time the consumer inverts the container, the contents of the container flow from the container through aperture **122** into contact with the nutritive substance **38**, which provides a gradual release of the nutritive substance **38** during consumption of the product.

It should be understood that a tear band is not required in this embodiment. Any device which prevents blade **154** from contacting blister pack **31** until just before consumption of the product may be utilized in this embodiment.

In a separate embodiment, the container closure may have a cutting edge on the outside of the cap. The cap can be removed from the container closure, used to pierce or cut the blister pack, and then replaced upon the container to intermix the contents of the container with the nutritive substance.

In a particular embodiment, the blister pack may be glued to the inner sealing layer of the container. A hole may be pre-cut into the paperboard container and the blister pack may be glued to the inner sealing layer of the container over the hole. This allows the blister pack to be added in a secondary operation. A straw may be used in combination with the blister pack of this embodiment or any of the embodiments described herein. The straw may perforate the blister pack and inner sealing layers of this embodiment. In this embodiment, the blister pack is arranged such that the top of the blister pack does not extend past the top of the paper portion of the container. This allows the container to accept normal case stacking, palletizing, and shipping without puncturing or otherwise damaging the blister pack.

In yet another embodiment, the blister pack is designed such that it can be punctured by pushing with one's finger. In this embodiment, the blister pack is scored and is easily punctured upon manual pressure. The blister pack may tear upon finger pressure, exposing the nutritive substance to the container.

In some embodiments, the blister pack of the present invention may be manufactured in a strip pack or a chain pack format.

In another embodiment, the container is a flexible pouch made of plastic film. In an embodiment, the plastic film may be a laminate foil. In other embodiments, the plastic film may comprise polyethylene, polypropylene, or any other plastic film known in the art. In some embodiments, the container is generally triangular in cross-section and has a flat or gusseted base which supports the pouch in a stand-up position.

FIGS. **14-19** illustrate an embodiment of such a container. In this embodiment, the flexible container **50** has at least one sidewall **51** and a base **52**. In an embodiment, the container **50** has two opposite sidewalls that are bonded at the side and top edges, each sidewall being bonded to the base **52** at the bottom edge.

In an embodiment, one sidewall **51** of the container **50** has an aperture **59** formed therein. The aperture **59** may be circular or may be any shape known in the art. In an embodiment, the aperture **59** is located near the top of sidewall **51**.

An outer pierceable seal **55** may be permanently bonded to the outside of the sidewall **51**, covering aperture **59**. In addition, an inner pierceable seal **56** may be permanently bonded to the inside of sidewall **51**, covering aperture **59**. In a particular embodiment, outer pierceable seal **55** and inner pierceable seal **56** form a pocket **54** between them, located within aperture **59**.

In some embodiments, the outer pierceable seal **55** is dimpled, or otherwise marked, such that a consumer can easily identify the outer pierceable seal **55** and the aperture **59** beneath it. In other embodiments, the outer pierceable seal **55** may be colored or textured such that it is easily identifiable against sidewall **51**. The outer pierceable seal **55** may be circular, square, triangular, star-shaped, or any other shape known in the art. The outer pierceable seal **55** and inner pierceable seal **56** may be made from a plastic material or a foil material. In an embodiment, the outer pierceable seal **55** and inner pierceable seal **56** may be thin films of aluminum.

A nutritive substance **57** may be present in pocket **54**. In this configuration, the nutritive substance **57** is protected from the container contents and the atmosphere until the outer pierceable seal **55** is pierced.

A straw **53** may be provided in connection with the container **50**. The straw may be removably attached to the sidewall **51** of the container **50**. The straw may be deformable. In some embodiments, the straw is enclosed in a plastic sheath **62**, preventing contact between the straw **53** and the atmosphere until the plastic sheath **62** is removed. In particular embodiments, the protective sheath **62** containing the straw **53** is removably bonded to the outside of the container **50**. In order to facilitate the piercing of the outer pierceable seal **55** and inner pierceable seal **56**, the straw **53** may have a sharpened end. The straw **53** may have a stopper, preventing insertion of the entire straw **53** into the container.

In consumption of the product contained within container **50**, the straw **53** is inserted through outer pierceable seal **55** and inner pierceable seal **56** in a cross-directional angle, contacting the contents of the container. As the straw pierces outer pierceable seal **55** and inner pierceable seal **56**, pocket **54** is pierced and the nutritive substance **57** is dispersed from pocket **54** into the interior of container **50**. The nutritive substance **57** then immediately contacts and mixes with the contents of container **50**. The product may then be consumed by drinking through the straw.

In a particular embodiment, the hole that is pierced in outer pierceable seal **55** is the same circumference as the outer surface of the straw **53**, such that the nutritive substance **57** is not expelled into the atmosphere via the hole in outer pierceable seal **55**.

In a separate embodiment, illustrated in FIGS. **18-19**, sidewall **51** does not have an aperture formed therein. Instead, sidewall **51** has a weakened region **58** which is adapted to be pierceable by a straw via insertion therethrough. The weakened region **58** may be located near the top edge of sidewall **51**. The weakened region **58** may be formed by creating a dimple in the sidewall **51** under heat and pressure. The weakened region **58** may have a thickness that is thinner than the remainder of sidewall **51**. In this embodiment, locating indicia may be printed on the sidewall **51** surrounding the weakened region **58** to identify its location.

An inner pierceable seal **56** may be permanently bonded to the inside of sidewall **51**, surrounding the weakened region **58**. In a particular embodiment, the sidewall **51** and inner pierceable seal **56** form a pocket **54** between them. As a straw pierces sidewall **51** and inner pierceable seal **56**, pocket **54** is pierced and the nutritive substance **57** is dispersed from pocket **54** into the interior of container **50**. The nutritive substance **57** then immediately contacts and mixes with the contents of container **50**. The product may then be consumed by drinking through the straw.

In this embodiment, a protective cover **60** may be removably adhered to the outside of sidewall **51**, over the weakened region **58**, to prevent inadvertent puncture during transportation and storage. The protective cover may include a tab **61** to enable a user to pull upwards and/or backwards to remove the protective cover **60**. The tab **61** may be located along an edge of protective cover **60** or may be attached across the center of protective cover **60**. Tab **61** may be formed from the same material as protective cover **60** or may be formed of, or coated with, a different material to increase gripability of the tab. The tab **61** may be bonded to or integrally formed with protective cover **60**.

In an embodiment, the container of the invention has sufficient barrier properties to prevent passage of essential oils, vitamins, minerals, or flavorings into or out of the container itself. In some embodiments, the paper or cardboard container of the invention could be laminated on one or both sides with one or more layers of polyethylene, acrylonitrile-butadiene-styrene, styrene-acrylonitrile, polyvinyl chloride, polystyrene, polycarbonate, polypropylene, polyethylene terephthalate, glycol-modified polyethylene terephthalate, nylon, polyvinylidene chloride, or ethylene-vinylalcohol copolymer. In this embodiment, a polymeric adhesive may be used to bond the layers. In other embodiments, the paper or cardboard may be laminated with a dual-layer laminate foil. In this embodiment, the foil layer may comprise aluminum foil.

The container of the invention may be formed using conventionally-known manufacturing techniques, such as a horizontal form-fill-seal machine with single or multiple lanes, a flat bed pre-made pouch machine, or a vertical form-fill-seal machine. The container is generally formed by folding sheets of material over each other achieve a predetermined shape. The aperture may be punched in one wall of the container or the weakened region may be formed for insertion of the straw. Any necessary seals may be adhered to the container wall. The edges may be joined together using a sealing technique such as bonding or welding. An upper or lower edge of the front and back panel may not be sealed until after the container is filled. The container may be placed in a gripper assembly or a holder such as a cup or puck prior to the filling process. To fill the container, the upper edges of the container are spread apart. Grippers may be utilized to pull the panels apart. In addition, a concentrated flow of gas may be directed toward the upper edge of the container to separate the panels or a suction cup may be used to separate the panels. The container is then filled, sterilized, sealed, and finished.

In each of the above described embodiments, the nutritive substance may be any known in the art. For example, the nutritive substance may be a macronutrient, a micronutrient, a bioactive agent, a long-chain polyunsaturated fatty acid, a probiotic, a prebiotic, a vitamin, a mineral, or combinations thereof. The nutritive substance may be a substance that is sensitive to heat, light, oxygen, moisture, or any component that is contained within the container body. In an embodiment, the nutritive substance is maintained as sterile until the user desires to mix the nutritive substance and the product within the container.

In a particular embodiment, the nutritive substance is a probiotic. The probiotic may be any probiotic known in the art. In particular embodiments, the probiotic is impregnated into a gum substrate. The gum substrate may, in some embodiments, comprise plant starches, instant hydratable starches, pregelatinized starches, instantized cold soluble starches, disintegratable starches, immobilized food-grade resins, or low-melting fats impregnated with disintegrating starches. In a particular embodiment, the gum substrate may comprise a low-melting fat impregnated with a disintegrating starch, which on contact with water can swell and release the probiotic. In another embodiment, the gum substrate may comprise an immobilized food-grade resin, which can be

used to adsorb the probiotic. Upon contact with water, the immobilized food grade resin readily dislodges the probiotic. In particular embodiments, hydrophilic substances, such as emulsifiers, can be included in the gum substrate to assist in the release of the probiotic upon contact of the probiotic with the product.

In another embodiment, the probiotic may be applied as a powder that is suspended in an oil- or wax-based suspension. Any oil or wax known in the art may be utilized in this embodiment, assuming it does not adversely affect the properties of the container or the contents of the container. In yet another embodiment, the probiotic is applied as a powder.

In at least one embodiment, the probiotic may be *Lactobacillus rhamnosus* GG. In another embodiment, the probiotic may be Bifidobacterium BB-12. In a particular embodiment, the probiotic may be a combination of *Lactobacillus rhamnosus* GG and Bifidobacterium BB-12. In some embodiments, the level of probiotic present is within the range of about 1×10^5 colony forming units (cfu) per gram formula to about 1×10^{10} cfu per gram formula. In other embodiments, the level of probiotic present is within the range of about 1×10^6 colony forming units (cfu) per gram formula to about 1×10^9 cfu per gram formula. In some embodiments, the level of probiotic present is within the range of about 1×10^6 colony forming units (cfu) per gram formula to about 1×10^8 cfu per gram formula.

Because many probiotics are sensitive to heat and may be damaged or killed if subjected to the heat treatment that is necessary for many food and drink products, the present invention provides the compartmentalized storage of a probiotic. In the present invention, the product contained within the container may undergo heat treatment or sterilization during the packaging process. After the product has been packaged into a container and sterilized, a seal containing a probiotic layer may be affixed to the container. The package may then be prepared for shipment or display. In these configurations, the probiotic is not subjected to damaging heat treatment during packaging and is kept separate from the product itself until consumption, at which time the two can be intermixed.

Thus, in some embodiments, the invention comprises a method for making a delivery container comprising a) providing a container as described herein; b) filling the container with a product; c) sterilizing the product-filled container; and d) sealing the container with a seal as described herein.

The product contained within the container may be any product known in the art. In some embodiments, the product is in a form selected from a liquid, ready-to-use product, liquid concentrate, fluid, powder, suspension, emulsion, or combination thereof. In some embodiments, the product contained within the container is a food or drink product. In a particular embodiment, the product contained within the container is a nutritional supplement for children or adults. In another embodiment, the product contained within the container of the invention may be a beverage, such as milk, fruit juices, or similar products. In some embodiments, the product may be an infant formula.

All references cited in this specification, including without limitation, all papers, publications, patents, patent applications, presentations, texts, reports, manuscripts, brochures, books, internet postings, journal articles, and/or periodicals are hereby incorporated by reference into this specification in their entireties. The discussion of the references herein is intended merely to summarize the assertions made by their authors and no admission is made that any reference constitutes prior art. Applicants reserve the right to challenge the accuracy and pertinence of the cited references.

These and other modifications and variations to the present invention may be practiced by those of ordinary skill in the art, without departing from the spirit and scope of the present invention, which is more particularly set forth in the appended claims. In addition, it should be understood that aspects of the various embodiments may be interchanged in whole or in part. Furthermore, those of ordinary skill in the art will appreciate that the foregoing description is by way of example only, and is not intended to limit the invention so further described in such appended claims. Therefore, the spirit and scope of the appended claims should not be limited to the description of the preferred versions contained therein.

What is claimed is:

1. A container for delivering a nutritive substance comprising:

a. a container body having a base, at least one sidewall, and a top wall, wherein an aperture is formed in the top wall;

b. a blister pack comprising a top layer and a bottom layer, wherein the layers are formed to create a cavity therebetween and wherein the blister pack is permanently sealable to the container top wall over the aperture; and

c. a nutritive substance bonded within the blister pack cavity.

2. The container of claim **1**, wherein the blister pack prevents contact between the container contents and the atmosphere until altered.

3. The container of claim **1**, wherein the top and bottom layer of the blister pack are rupturable.

4. The container of claim **1**, additionally comprising a straw removably attached to the outside of the container.

5. The container of claim **4**, wherein the straw is capable of being inserted through the blister pack to disperse the nutritive substance into the interior of the container.

6. The container of claim **1**, additionally comprising a closure permanently sealable over the blister pack.

7. The container of claim **6**, wherein the closure is adapted to pierce or cut the blister pack top and bottom layers such that the nutritive substance is dispersed into the container.

8. The container of claim **1**, wherein the blister pack top and bottom layers are formed of a material selected from the group consisting of polyvinyl chloride, polystyrene, and a laminate foil.

9. The container of claim **1**, wherein the nutritive substance comprises a probiotic.

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